AMENDMENTS TO THE CLAIMS

This Listing of Claims will replace all prior versions, and listings, of claims in the application:

1. (Currently amended) A population of labeled oligonucleotide probes comprising different labeled oligonucleotide probes, each labeled oligonucleotide probe comprising an oligonucleotide having n bases associated with a tag comprising a series of detectably distinguishable signal molecules, a total number of the labeled oligonucleotide probes in the population being greater than a total number of the detectably distinguishable signal molecules in the population, wherein a first detectably distinguishable signal molecule is used to encode the base information for the first nucleotide of the oligonucleotide of said each labeled oligonucleotide probe, a second detectably distinguishable signal molecule is used to encode the base information for the second nucleotide of the oligonucleotide of said each labeled oligonucleotide probe, and so on until an nth detectably distinguishable signal molecule is used to encode the base information for the nth nucleotide of the oligonucleotide of said each labeled oligonucleotide probe, wherein the number ~~and type~~ of the detectably distinguishable signal molecules at each position in the tag ~~identifying~~ indicates the type of the nucleotide ~~sequence~~ in each position of the oligonucleotide of said each labeled oligonucleotide probe, ~~wherein each probe is configured to bind to an oligonucleotide target, and the type of nucleotide at each position in at least one of the labeled oligonucleotide probes is configured to be identified by an intensity of at least one of the unique signal molecules~~.

2. (Original) The population of labeled oligonucleotide probes of claim 1, wherein each unique signal molecule is present up to 4 times per labeled oligonucleotide probe.

Claims 3-4 (Cancelled)

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5. (Original) The population of labeled oligonucleotide probes of claim 1, wherein each labeled oligonucleotide probe comprises an intensity reference signal molecule.

6. (Original) The population of labeled oligonucleotide probes of claim 1, wherein each oligonucleotide is an identical length of about 10 to 50 nucleotides.

7. (Original) The population of labeled oligonucleotide probes of claim 1, wherein the signal molecules are Raman labels.

8. (Previously Presented) The population of labeled oligonucleotide probes of claim 7, wherein the series of signal molecules comprise a polymethine dye or a signal molecule selected from the group consisting of 2-Aminopurine, 2-Fluoroadenine, 4-Amino-pyrazolo[3,4-d]pyrimidine, 4-Pyridinecarboxaldoxime, 8-Azaadenine, Adenine, 4-Amino-3,5-di-2-pyridyl-4H-1,2,4-triazole, 6-(g,g-Dimethylallylamino)purine, Kinetin, N6-Benzoyladenine, Zeatin, 4-Amino-2,1,3-benzothiadia- zole, Acriflavine, Basic blue 3, Methylene Blue, 2-Mercapto-benzimidazole, 4-Amino-6-mercaptopyrazolo[3,4-d] pyrimidine 6-Mercaptopurine, 8-Mercaptoadenine (adeninethiol), 9-Aminoacridine, Cyanine dyes, Ethidium bromide, Fluorescein, Rhodamine Green, and Rhodamine-6G.

9. (Original) The population of labeled oligonucleotide probes of claim 1, wherein the signal molecules are fluorescent labels or quantum dots.

10. (Original) The population of labeled oligonucleotide probes of claim 1, wherein the signal molecules are a series of nanotags.

Claims 11-23 (Cancelled)

24. (Currently amended) A reaction mixture, comprising a target polynucleotide and an isolated population of labeled probes comprising different labeled oligonucleotide probes, wherein each labeled probe comprises an oligonucleotide

having n bases associated with a tag comprising a series of detectably distinguishable signal molecules, a total number of the labeled oligonucleotide probes in the population being greater than a total number of the detectably distinguishable signal molecules in the population, wherein a first detectably distinguishable signal molecule is used to encode the base information for the first nucleotide of the oligonucleotide of said each labeled oligonucleotide probe, a second detectably distinguishable signal molecule is used to encode the base information for the second nucleotide of the oligonucleotide of said each labeled oligonucleotide probe, and so on until an nth detectably distinguishable signal molecule is used to encode the base information for the nth nucleotide of the oligonucleotide of said each labeled oligonucleotide probe, wherein the number of the detectably distinguishable signal molecules at each position in the tag indicates the type of the nucleotide in each position of the oligonucleotide of said each labeled oligonucleotide probe~~the nucleotide sequence of each oligonucleotide being represented by the number and type of signal molecules associated with the oligonucleotide, wherein each probe is configured to bind to an oligonucleotide target, and the type of nucleotide at each position in at least one of the labeled probes is configured to be identified by an intensity of at least one of the unique signal molecules~~.

25. (Original) The reaction mixture of claim 24, wherein each unique signal molecule is present up to 4 times per labeled oligonucleotide probe.

Claims 26-27 (Canceled)

28. (Original) The reaction mixture of claim 24, wherein each labeled oligonucleotide probe comprises an intensity reference signal molecule.

29. (Original) The reaction mixture of claim 24, wherein each oligonucleotide is an identical length of about 10 to 50 nucleotides.

30. (Original) The reaction mixture of claim 24, wherein the population of labeled oligonucleotide probes comprises all possible sequence combinations of an oligonucleotide of the identical length.

31. (Original) The reaction mixture of claim 24, wherein the signal molecules are Raman labels.

32. (Previously Presented) The reaction mixture of claim 3 1, wherein the series of signal molecules comprise a polymethine dye or a signal molecule selected from the group consisting of 2-Aminopurine, 2-Fluoroadenine, 4-Amino-pyrazolo[3,4-d] pyrimidine4,-Pyridinecarboxaldoxime, 8-Azaadenine, Adenine, 4-Amino-3,5-di-2-pyridyl-4H-1,2,4-triazo6l- e, (g,g-Dimethylallylamino)purine,K inetin, N6-Benzoyladenine, Zeatin, 4-Amino-2,1,3-benzothiadiazole, Acriflavine, Basic blue 3, Methylene Blue, 2-Mercapto-benzimidazole, 4-Amino-6-mercaptopyrazolo[3,4-dlpyrimidine,6 - Mercaptopurine, 8-Mercaptoadenine (adenine thiol), 9-Aminoacridine, Cyanine dyes, Ethidium bromide, Fluorescein, Rhodamine Green, and Rhodamine-6G.

33. (Original) The reaction mixture of claim 24, wherein the signal molecules are fluorescent labels.

34. (Original) The reaction mixture of claim 24, wherein the signal molecules are a series of nanotags.

35. (Previously Presented) The population of labeled oligonucleotide probes of claim 1, wherein a location of a peak in a response spectra of a sample comprising- the labeled oligonucleotide probes indicates the presence of a particular labeled oligonucleotide probe while the skeintensitv of the peak is proportional to the number of h? particular labeled oligonucleotide probe.

36. (Previously Presented) The reaction mixture of claim 24, wherein a location of a peak in a response spectra of a sample comprising- the labeled oligonucleotide probes indicates the presence of a particular labeled oligonucleotide probe while the intensity of the peak is proportional to the number of the particular labeled oligonucleotide probe.

37. (Previously Presented) The population of labeled oligonucleotide probes of claim 1, wherein each signal molecule is assigned to encode a subunit of a template polynucleotide.

38. (Previously Presented) The reaction mixture of claim 24, wherein each signal molecule is assigned to encode a subunit of a template polynucleotide.

39. (Previously Presented) The population of labeled oligonucleotide probes of claim 1, wherein each labeled oligonucleotide probe comprises a single strand.

40. (Previously Presented) The population of labeled oligonucleotide probes of claim 1, wherein the labeled oligonucleotide probes are not immobilized.

41. (Previously Presented) The population of labeled oligonucleotide probes of claim 1, wherein each labeled oligonucleotide probe further comprises two or more linkers that link two or more signal molecules and the probe.

42. (Previously Presented) The population of labeled oligonucleotide probes of claim 1, wherein the labeled oligonucleotide probes comprise two or more labels and the series of detectably distinguishable signal molecules are divided among the two or more labels, the two or more labels attached at different positions on the probe.

43. (Previously Presented) The population of labeled oligonucleotide probes of claim 1, wherein the series of detectably distinguishable signal molecules comprises a

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number of different signal molecules, the number of different signal molecules equal to
the number of labeled bases in the labeled oligonucleotide probes.

44. (Previously Presented) The reaction mixture of claim 24, wherein each
labeled oligonucleotide probe comprises a single strand.

45. (Previously Presented) The reaction mixture of claim 24, wherein the labeled
oligonucleotide probes are not immobilized.

46. (Previously Presented) The reaction mixture of claim 24, wherein each
labeled probe further comprises two or more linkers that link two or more signal
molecules and the probe.

47. (Previously Presented) The reaction mixture of claim 24, wherein the labeled
oligonucleotide probes comprise two or more labels and the series of detectably
distinguishable signal molecules are divided among the two or more labels, the two or
more labels attached at different positions on the probe.

48. (Previously Presented) The reaction mixture of claim 24, wherein the series
of detectably distinguishable signal molecules comprises a number of different signal
molecules, the number of different signal molecules equal to the number of labeled
bases in the labeled oligonucleotide probes.